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FORESTS OF THE ALPS.

[Pont Alto, near Agordo.]

AMONG the great fir forests of the Alps, those of Styria and of the Tyrol are perhaps the most distinguished for extent and abundance. They cover the middle region of that vast range of mountains, and stretch downwards to the very verge of, and in many parts even encroach upon, the cultivated fields of the lower valleys. The character of the scenery has been thus described by Mr. Beckford:—"There seemed no end to these forests, except where little irregular spots of herbage, fed by cattle, intervened. Whenever we gained an eminence, it was only to discover more ranges of dark wood, variegated with meadows and glittering streams. White clover and a profusion of sweet-scented flowers clothe their banks; above waves the mountain-ash, glowing with scarlet berries; and beyond rich hills, rocks, and mountains, piled one upon another, and fringed with fir to their topmost acclivities. Perhaps the Norwegian forests alone equal these in grandeur and extent."* In these districts the people draw almost their entire subsistence from the forests, their chief employment being the cutting down and transplanting the timber, either to the neighbouring salt-mines and iron-furnaces for fuel, or to the nearest navigable stream or river for exportation. Where the forests are on the banks of streams of this kind, the transport is a comparatively easy matter, but the most valuable forests are frequently several miles distant, a circumstance that, but for the discovery of some such ingenious mode as that we are about to describe, would have rendered them perfectly valueless for any commercial purposes. This is a slide or trough, constructed of successive layers of six or eight fir-trees, placed side by side lengthwise, so as to form a semicircular hollow, the trees being made smooth by stripping off the bark. The slide has a gradual descent, sometimes curving in its course round the shoulders of mountains, sometimes disappearing in tunnels cut through the solid rock, whilst at other times again it is borne over yawning ravines, by the tall pillar-like stems of trees. The famous slide of Alpnach was constructed in this manner, and extended from an elevation of two thousand five hundred feet, down to the lake, a distance, according to its route, of between eight and nine miles. Trees a hundred feet long were conveyed this distance in six minutes. The slide however did not permanently succeed in accomplishing the pur-

* 'Italy,' vol. i., p. 70.

poses for which it was designed, and has accordingly been suffered of late years to fall to decay. Its last service was the bringing down timber to be employed in the building of the new and beautiful church of Alpnach.

Slides of the description we have given traverse almost every part of the Alpine forests. Their use is in a great measure confined to the winter season. Early in the spring the wood-cutters set off in troops to begin their business of cutting down the trees, so as to have all in readiness by the time the frost sets in. Their first business is to construct rude huts of logs and branches, in which to reside during their protracted stay. This accomplished, the axe is in requisition, and all day long, and for months together, the forest resounds with its blows and with the crash of the falling timber. The trees are sorted as they are cut down; those fit for masts or other purposes of ship-building being carefully preserved entire, whilst the others are cut up into logs for fuel for the salt-mines, or to be converted into charcoal for the smelting and forging of iron. These logs are heaped up into immense stacks. This work continues, as we have observed, till the winter comes, and the snow is upon the ground. The wood-cutter now puts the cramp-irons on his feet, and conveys the wood, either by hand-sledges or by oxen, to the slide, or to the crown of a neighbouring precipice, if there be one overhanging the stream below. The snow is now partially cleared away from the trough, and a few logs are thrown down to smooth the passage. Water is next poured into it, which quickly freezes, leaving a surface of ice through its entire extent, that of course serves to diminish the friction, and thus to increase the velocity. The trees are now placed in the trough and dismissed, when they at once descend, with almost incredible velocity, to the place of their destination. When the slide terminates on the brow of a precipice overhanging a lake, into which it discharges its burden, the effect is very grand. The trees come bounding forth from the mouth of the slide, leaping in their fall full half way across the broad waters, and falling with a noise like that of thunder, echoed again and again by the surrounding mountains. When the streams traversing the forests are too shallow to transport the timber, a dam is formed where the banks are narrow, and the water allowed to accumulate till it forms a wide lake. Into this the firs from the woods are thrown, till a sufficient quantity is collected; a sluice-gate is then opened, and the great impetus of the pent-up water as it rushes along becomes sufficient to convey the floating timber to the broader stream or river below. On such occasions, as well as in passing cascades, or in falling from lofty heights, the loose timber frequently attaches itself to rocky projections or to matted brushwood, and demands from the wood-cutter the most arduous and dangerous part of his duty. He has frequently to be let down from lofty perpendicular or overhanging rocks to a great depth, with no other support than a rope, in order that with his axe he may clear away the obstructions. Across the rivers, at the entrance of the principal valleys, and in the neighbourhood of the salt-mines and furnaces, a wooden grating is erected, to collect the floating timber. Here each proprietor receives his own from the mass, the logs belonging to different persons being distinguishable by their respective lengths.

The wood-cutters appear to be paid by means of a tax levied on the proprietors for every stack of wood by the owners of the rivers, whose charge for the use of the rivers is also defrayed by the same impost.

A few only of the finest firs are kept to be exported. The mode of transport is to form them into a raft, sometimes three hundred feet long, and which may be frequently seen on the Rhine and on the Danube, floating lazily along, with perhaps ten and twelve huts erected on the roof. The chief places of destination are the ports of the Black Sea and of the Adriatic.

Under peculiar circumstances, as for instance where the forests are on one side of a range of hills, and large salt-works and furnaces requiring considerable quantities of fuel on the other, with no available stream at hand to convey it by a circuitous course,—in cases of this character, the timber is made to ascend the brow of the mountain, in order that it may then descend as usual on the other side. This ascent is thus managed:—a vast inclined plane, called the wood elevator, is constructed from the bottom of the valley to the summit of the height overlooking it. On this waggons run up and down, which, when loaded, are drawn by ropes attached to a kind of windlass, communicating with a water-wheel turned by a neighbouring torrent. Precipices many hundred feet high are thus scaled.

HISTORY OF A MAHOGANY TABLE.—III

Our mahogany table still wants that without which it would not be recognised as a table at all, that is, the flat top: for this the workman must reserve his best piece of mahogany, and must exercise his best skill, since it is that part which comes most frequently under the eye.

Two different modes of proceeding are adopted, according as the top is veneered or not. In the latter case a good, sound, and handsome piece of wood, probably about an inch in thickness, is selected; and as mahogany planks are frequently to be met with two or three feet wide, it is very probable that no glueing will be necessary. The wood is prepared with more care than if it were deal, both on account of the superior appearance required, and of the difficulties which the grain of the wood presents. In planing a piece of deal, if attention be not paid to the direction of the grain, the plane digs up the wood in pieces, instead of taking off a shaving; but on reversing the position of the piece of wood on the bench, all is set right. In planing mahogany, however, this reversing of the wood is not sufficient, on account of the exceeding crookedness, or "crossness" of the grain; and in order to prevent the cutting of the surface in a ragged manner, the iron of the plane is confined by another iron in such a manner as to be able to take off only a very thin shaving from the surface. The surface is planed all over with considerable care, and for a much longer time than if the wood were deal; and even after the plane has been sufficiently used, the surface of the wood is well scraped with a smooth but somewhat blunt steel edge.

Where the top of a table is not veneered, and even sometimes where it is, it is customary to finish the edge with a reeded, hollow, or oval moulding. For everything of this kind, the cabinetmaker, as well as the joiner, is well provided with planes: the iron of each plane is not flat or straight edged, as in those for smoothing, but is cut into the form requisite for producing the moulding, and is fixed in a block or frame whose face has nearly the same figure. The board whose edge is to have a moulding of any sort worked upon it, whether it be the top of a table or anything else, is fixed firmly with the edge uppermost, and then planed to the proper form.

But a veneered table-top is that of which the making is most difficult. As veneering is a plan adopted to save a portion of the expense which would be incurred by using solid mahogany, it is seldom that the veneering is done on mahogany; but a cheaper wood, such as deal, is used for the ground, since it will not meet the eye when the furniture is complete.

As deals are not wide enough to form the top of a table, two or more of them must be glued side by side, to make the necessary width; and this requires us to speak of other kinds of joints than those alluded to in the last paper. We have said that when two pieces of wood are joined end to end, the dove-tailed joint is very much used; and that when the end of one piece is joined to the side of another, the tenon-and-mortice joint is more

employed. Now in the present instance, the joint is different from either of those; for two pieces of wood are united side by side, so that the ends of the fibres do not form part of the joint. In this latter case, if the wood be well seasoned, the edges may be planed at right angles to the surfaces, and then glued together; for if the two edges be brought together truly parallel, the glueing will produce a very firm and excellent joint. For some purposes it is necessary to plough a groove in the edge of one board, and leave a corresponding projection in the edge of the other, so that the two boards in some respects lap over each other. In other instances a groove, or rebate, is made in the edge of one piece of wood towards the upper surface, and in the edge of the other towards the lower surface; so that the projecting part of one piece shall fit into the hollow or groove of the other. We believe however that the common and simple joint is that most frequently employed for a broad slab or surface afterwards to be veneered; and the following plan is sometimes adopted, to prevent the wood from warping, &c.:—those deals are selected which are most free from knots, and are slit down into pieces four inches or four and a half inches wide; these are glued up, an edge which had been nearest the heart of the tree being joined to an outside edge; when the glueings are dry, the board is cut up again into slips, midway between the former joints, and rejoined, a change being made in the order of placing the pieces. By this means the whole top of the table consists of pieces only about two inches wide, glued together so as to lessen as much as possible the liability to warping.

Let us suppose then, that the piece which is to form the top of the table is glued up to its proper size, and ready for veneering; we proceed to speak of this important process. In the first paper we described the means by which the veneers are cut from the log of mahogany; and from the description there given it will easily be understood that both surfaces of each sheet of veneer are left rough by the action of the saw. The cabinetmaker buys the veneer in this rough state, and he must alter the nature of the surface before he can venture to glue it on the work. He cuts a piece of veneer a little larger than the top of the table, to allow for waste, &c., and lays it flat on his bench. He then take a veneering-plane, and works regularly over the whole surface of the veneer in the direction of the grain: this veneering-plane is of small size, and the iron belonging to it, instead of being fine and smooth like that of other planes, is jagged with a number of notches, like the teeth of a very fine saw. With this plane the veneer is worked until all the saw-marks are obliterated, and replaced by regular channels, or rather scratches along the direction of the grain; and the surface on which the veneer is to be glued is scratched with the plane in like manner; the object of these scratches, or this symmetrical roughness, if we may use such a term, is to enable the glue to take a firmer hold.

The glue for veneering should be sufficiently fluid to flow easily from the brush, and the wood on which it is to be laid must be well warmed before a fire. When all is ready, the glue is laid on with a brush, quickly and in plentiful quantity. The piece of veneer is then taken by two persons, laid on the slab of deal, and rubbed backwards and forwards to press the glue into all the little indentations in both surfaces of the wood; it soon becomes so adhesive as to be no longer capable of being moved to and fro, and is then left in its place. The slight pressure it has hitherto undergone has not been sufficient to make the veneer adhere in every part to the deal; and there are many spots where the veneer swells up, in consequence of accumulations of glue beneath. To level these protuberances is a point of much importance, and is effected thus:—a piece of wood about three inches square and an inch thick has a straight strip of iron-plate fixed to one edge, and is called a veneering-hammer; the workman takes hold of it by a handle projecting from the right side, places the iron edge close to the veneer, and, with his left hand resting on the block to increase the pressure, works regularly all over the veneered surface, squeezing out the superfluous glue from every spot where it may happen to have lodged too abundantly. The pressure or rubbing begins at the centre, and proceeds thence towards the edges, where the glue is forced out; from time to time the workman strikes the veneer in various parts; if the sound returned is distinct and solid, it is known that the veneer adheres closely to the deal; but if it is hollow or dull, he infers that either glue or air prevents the contact of the surfaces: in the latter case a greater degree of pressing or rubbing is necessary. Two men are generally engaged at this work, in order to get the veneer firmly pressed down before the glue becomes too cold. As the outer edges are very likely not to adhere closely, they are kept down either by the pressure of heavy weights or by wooden screws often used by the cabinetmaker; these screws consist of two pieces of wood or clamps, which are brought into greater or less proximity by means of wooden screws; they are placed so that the veneered surface shall be grasped between the two clamps, and retained there till the glue is cold. When the glue is cold, the veneer is tried all over again with a hammer, in order to discover, by the sound, whether there are any hollow places beneath; if there are such, they are remedied in a singular manner: a hot iron is laid on the defective part, which thus becomes hot through, and remelts the glue beneath; a small portion of the veneer is also heated from that spot to the nearest edge, and by means of the sort of channel thus produced the glue which had caused the defect is squeezed out towards the edge. This is the only means known for remedying a defect which would spoil the appearance of the table if allowed to remain.

Whatever other part of the table, such as the front of the drawer, or any part presenting a tolerably plain surface, may be veneered, the mode of effecting it is nearly identical with that described above; if the surface be curved, an additional degree of care is required to make the veneer bend round the curvature and adhere to it, but in other respects the process is similar. Generally speaking, where a table is provided with flaps, it is customary to make the flaps of solid mahogany,—indeed the whole top of the table; because there are so many sharp edges exposed when the flaps are down, that a veneered surface would be very liable to be split and broken, on account of the difficulty of making veneers adhere at the extreme edges.

The table-top, whether of solid mahogany or veneered, is usually fixed on the frame-work by screws from beneath; these screws pass obliquely upwards through the frame-work, and penetrate into the top of the table sufficiently to ensure a firm hold, but without appearing at the upper surface. In a flapped table, the flaps are connected with the central part of the bed by a joint, which, as it is frequently in sight, is finished with much neatness; the adjoining edges of the wood, and the hinges which form the connection, are prepared with much care and neatness also.

We have said nothing yet of polishing: our table still retains the appearance which the many processes to which it has been subjected have given to it: the veneered table is, indeed, in a very unsightly condition; scratched, rubbed, and with ragged edges; the finishing and polishing are therefore important matters. The surface of the veneer is, when quite dry, worked carefully over with a scraper, which consists of a flat square piece of steel about three inches long, with both edges very straight and smooth; these instruments are generally made out of old saw-blades. With this tool the veneer is scraped until all the scratches produced by the veneering-plane are removed from the surface, and the whole rendered

level and smooth. This smoothing is further assisted by the use of glass-paper, or sand-paper, which is well rubbed over every part of the veneer; the sand-paper is wrapped round a block of cork or of wood, by way of handle, and different degrees of fineness are used, the coarsest first. This process, to a smaller extent, is necessary for solid mahogany; but as it has not been scratched by the veneering-plane, a less degree of smoothing will suffice.

The table is now ready for polishing, a process which has, of late years, been done in a very beautiful manner. In old dark-looking family furniture, the polish, which used to form the pride of those who assisted in preserving it, was produced by frequent and long continued rubbing alone; furniture oil, which is in fact coloured linseed oil, will produce a good polish, but only after long repeated applications. Another mode long adopted was that of dissolving bees-wax in turpentine, and rubbing it on the wood with a piece of cloth; this produces a polish sooner than oil, but is in many respects inferior to it. The most perfect of all these contrivances is the use of what is called French polish; this is a varnish which is rubbed into the pores of the wood instead of being laid on with a varnish-brush. There are numerous receipts for making French polish, but nearly all of them consist of rectified spirit of wine, gum shell-lac, gum seed-lac, and Venice turpentine; or three out of these four.

Supposing the table to be ready for the polisher, the surface is wetted with oil, which is allowed to remain on for some time to deepen the colour, and is then carefully wiped dry. A piece of flannel is then wrapped up into a hard close coil; and the surface of this flannel is slightly wetted first with a little French polish and then with a little oil; a piece of clean linen is stretched over the coil to prevent any little impurities from the polish from getting on the furniture, and the coil is then rubbed gently backwards and forwards over the whole surface of the mahogany. The oil is no further useful than in facilitating the rubbing of the polish into the pores of the wood; if it is used in too great quantity, the surface of the wood becomes dull in consequence. When the small amount of polish has worked through the linen cloth and spread itself on the mahogany, the linen is removed, a fresh touch of polish and of oil given to the flannel coil, and the process repeated as before. This is continued in the same manner for a long period of time, as the portion of polish actually laid on at each application is a film of the most extreme thinness; indeed polishing is one of those manual employments of which the charge is made almost wholly for the workman's time, since the value of the material used is extremely small.

The polishing of any surface of an ornamental description, or any spots depressed below the common surface, is rather difficult, and requires a good deal of care; if the polish is allowed to remain in a pool, a fine surface cannot be produced; and if no polish at all reaches it, the defect is of course still greater. Sometimes the polish, on account of ornament, &c., cannot be rubbed at all; and it is therefore laid on in those parts merely as a varnish, by means of a brush. We may here remark that the philosophy of the action of a spirit varnish is this:—the solid matter held in solution by the spirit closely adheres to the polished body while the spirit evaporates; when all has evaporated, the minutely divided gums or resins forming the solid matter of the varnish become firmly united in a dry state, forming a glossy envelope to the wood.

Beautiful as French polish appears to the eye, it is not invariably useful, since it is incapable of bearing heat without injury; it is for this reason that dining-tables are generally left without any other polish than that which furniture-oil may gradually impart to them; the hot dishes which these tables so often bear would crack and blister French polish, if that were employed.

Our table is now pretty well finished, as far as we are able to finish it with mere pen and ink. It will of course be understood that any change in the shape or designation of the table is likely to render a different process necessary in some of the parts. We have spoken of a table with a drawer; this drawer will require a handle or two, and perhaps a lock, the fitting of which requires a neat hand and small tools. It might have been a card-table, in which the top is not polished, but is covered with green or blue baize; or a library-table, of which the top is covered with black leather, or some other convenient material. If it were a dining-table, capable of being made three or four yards long, there would be additional flaps, resting on supporters beneath, and bolted to the other parts of the surface. If it were a circular or square drawing-room table, it would have a turned and carved central pillar instead of four legs, and this pillar would rest on a plinth or support which is very likely to have a good deal of carving about it. But in all these cases the making of the table involves pretty nearly the same details as those which have occupied our attention, varied, of course, as circumstances rendered a change necessary. In any case it is worth a thought, and something approaching to admiration, to consider the steps by which the table at which we are sitting has been transformed from a gigantic tree growing in the wilds of South America.

Soil proper for the Vine.—One of the principal causes of grapes not ripening well on open walls in this country is the great depth of *mould* in which the roots of vines are suffered to run, which, enticing them to penetrate in search of food below the influence of the sun's rays, supplies them with too great a quantity of moisture; vegetation is thereby carried on till late in the summer, in consequence of which, the ripening process does not commence till the declination of the sun becomes too rapid to afford a sufficiency of heat to perfect the fruit. To prevent this, the subsoil should be composed of dry materials. It is almost impossible indeed to make a vine border of materials that shall be too dry or porous. It is not mere *earth* that the roots require to come in contact with, to induce growth and extension, but *air* also, which is as necessary to them as to the leaves and branches. The excrementitious matter discharged from the roots of a vine is very great, and if this be given out in a soil that is close and adhesive, and through which the action of the solar rays is feeble, the air in the neighbourhood of the roots quickly becomes deleterious, and a languid and diseased vegetation immediately follows. But if the roots grow in a soil composed of dry materials, mixed together in such a manner as to possess a series of cavities and interstices, into which the sun's rays can enter with freedom, and there exert their full power; the air in which the roots perform their functions becomes warm and purified, they absorb their food in a medium which dissipates their secretions, and a healthy and vigorous vegetation is the never-failing consequence. All borders, therefore, made expressly for the reception of vines, ought to be composed of a sufficient quantity of dry materials, such as *stones, bricklbats broken moderately small, lumps of old mortar, broken pottery, oyster-shells, &c., &c. Bones*, however, on account of their prolonged effect, are by far the most valuable manure that can be deposited in a vine border. They should be buried in the soil whole, and as fresh as possible. Every variety of size may be procured, from the smallest bone of a fowl to the largest bone of an ox. The small bones will decompose in a few months, but the largest will remain for twenty, thirty, and even fifty years, before they are entirely decayed, while the intermediate-sized ones, according to their respective kinds, will be continually decomposing in succession for a great number of years, yielding thereby a constant supply of nutriment of the most valuable description. It is worthy of remark also, that every bone, whether small or large, after it has been deposited in the soil a few weeks, will begin to yield, by the decomposition of the gluten on its surface, a steady supply of nutritious matter, and continue so to do until it be resolved into its constituent parts, and form part of the soil itself.—*On the Cultivation of the Vine on Open Walls, by Clement Hoare.*

THE PREVENTION AND EXTINCTION OF FIRES.—II.

[Continued from No. 531.]

[The first Fire-Engine. From an etching by Van der Heyden.]

In our last article on this subject we noticed the chief preventive measures which have been proposed from time to time to guard against fire in buildings. We have now to describe the modes of extinction usually adopted when prevention has failed.

Water seems such a natural antagonist to fire, that it is no wonder attention was early directed to its use on such occasions; but as the mere act of pouring water from buckets upon the flames of a burning house is but little calculated to check their progress, we find that attempts were frequently made to obtain a continuous stream, which might be propelled from a distance. The first instrument employed in England for this purpose was probably the water-squirt or hand-squirt, numbers of which were kept by the parish authorities, as the small fire-engines now are. The hand-squirt was usually between two and three feet in length, with an aperture at the lower end about half an inch in diameter, and a capacity of about half a gallon. It had a handle on each side; and the mode of using was this: two men held the squirt by the handles and the nozzle, while a third worked a piston within it in the manner of a syringe: the aperture was held downwards in a vessel of water, while the squirt was being filled; and upwards, when the water was to be propelled on the burning materials:—it was in fact precisely the same in principle as the common boy's squirt. After the great fire of London, the number of these squirts was ordered to be greatly increased; but they were in a short time superseded by the fire-engine.

About the end of the seventeenth century, one Zachary Greyl, a Pole, announced that he had devised a method of extinguishing fires, which he would promulgate on the payment of a certain sum, either by the government or by private individuals. His plan, as is usual in such cases, failed to produce any pecuniary benefit; nor does it appear that it was worth purchasing. A wooden vessel was provided, capable of holding a considerable quantity of water; and in the centre of this was fixed a case made of iron plates, filled with gunpowder. From the inner vessel to the head of the larger one proceeded a tube or pipe containing a composition easily ignited, and reaching down to the gunpowder. When an apartment was on fire, the composition was to be ignited, and the machine carried into the room: in a few minutes the effects of the ignition would reach the gunpowder, an explosion would take place, the two vessels would be burst to pieces, and the water in the outer one would be scattered about with great violence upon the burning materials. Such was the proposed action of Greyl's machine; but it requires little penetration to perceive that such a plan was not likely to become prevalent, since not only would the effects be insignificant against a powerful flame, but the whole machine would be destroyed in once using.

Far more worthy of notice is the *fire-engine*, for which we are indebted to Holland and Germany, although great improvements have been made in it in England within a recent period. John Hautsch of Nuremburg, and John and Nicholas Van der Heyden of Amsterdam, appear to have been the first, during the seventeenth century, to pay attention to the construction of these machines. There were, it is true, machines called water-syringes made by Anthony Blatner at Friedburg, so early as the year 1518; but the nature of those machines is now unknown: we proceed therefore to notice the fire-engine.

Caspar Schott, a Jesuit residing at Nuremburg, in a work written by him, alluded to a fire-engine constructed by Hautsch in the year 1657. He described it as a kind of water-cistern about eight feet in length, four in height, and two in width; and as being drawn by two horses, on a sledge ten feet long and four broad: it was worked by twenty-eight men; and a stream of water an inch in diameter could be thus forced to a height of eighty feet. Hautsch distributed engravings of his engine in different towns of Germany, and offered to construct similar machines for public use. This engine appears to have been

but little else than a forcing-pump, or perhaps a suction-pump and a forcing-pump combined. The difference between these two forms of pump may be exemplified by the common squirt or syringe. This is a tube in which a piston works tolerably water-tight: the lower end of the tube is narrowed to a small aperture; and when this end is immersed in water, and the piston drawn up by means of its handle, a vacuum is produced in the lower part of the tube on account of the impossibility of air gaining access to it: water immediately ascends into the tube to fill up the vacuum, and thus the supply is obtained. So far the instrument is what is termed a suction or sucking pump, and nearly corresponds in principle with the common household pump: we may here remark that the term *suction* gives a very erroneous idea of the action of such machines; since it seems to imply that the piston sucks or draws the water into the tube; whereas the water is pressed into it by the atmosphere from without. Supposing the squirt to be full of water, we transform its action to that of a forcing-pump, by pressing down the piston: the water, urged by this pressure, escapes from the lower aperture; and as this aperture is purposely made very small, the water issues from it with a force which carries it to a great distance. Such is the philosophy of a boy's squirt, and such appears to have been nearly the principle of Hautsch's fire-engine:—the piston was moved by twenty-eight persons instead of one; the aperture was an inch in diameter instead of being capillary; and the extent to which the stream was forced exceeded eighty feet.

But such an instrument was deficient in two notable appendages, which distinguish the fire-engines of modern times: these were, the air-chamber and the flexible hose or pipes. We may again make use of a squirt to illustrate what is meant by an air-chamber. The water can be propelled from the squirt only while the piston is being moved one way; but if we could manage to have a separate chamber or tube filled with air, and this air could be constantly kept under pressure, this pressure might be made a moving force to propel the water from the tube in which the piston works. Such is the case in the modern fire-engine: the handles at which the men work elevate and depress the piston alternately, and if there were no air-chamber the water would issue only by spirts, and not in a regular stream; but by an ingenious adaptation of valves, &c., the water in the engine is constantly pressed upon by condensed air, which, striving to regain its original bulk, continually presses the water towards the place of exit.

It is remarkable that the inventor of this improvement on the fire-engine is unknown. A figure and description of a fire-engine with an air-chamber was given by Perrault in a work published in 1684: he described it as having been kept in the king's library at Paris; that it threw out water to a great height; and that the stream was in one continued jet: but the name of the inventor of the machine was not mentioned. We may remark, however, that the experiments of Mariotte and others on the air-pump were very likely to have led to such a result as this.

The useful invention of the flexible leathern hose attached to the pipe of the engine, was due to the Van der Heydens of Amsterdam. These persons were inspectors of the apparatus for extinguishing fires at Amsterdam; and their first experiments on the flexible hose were made in 1672. The use of these pipes will easily be understood, since they enable the water to be carried through tortuous passages, and to spots totally inaccessible to the engine itself. The success of the new method was great, and the inventors obtained an exclusive privilege for making the machines for twenty-five years: they also published a work descriptive of their new engines; this work contained nineteen plates, seven of which represent conflagrations which had taken place in Amsterdam, and at which the old engines were used; and twelve plates representing other fires at which the new engines had been successfully employed. These two persons also invented the method of filling the engine by pumping the water up from a well or reservoir through a stiff pipe, having at the extremity a metal strainer, pierced with holes, to prevent the admission of dirt: these feeding-pipes they called *wasserschlange* (water-snakes), and in some cases conveyed water to the engine from a distance of a thousand feet.

The improved engines, provided both with an air-chamber and with flexible hose, appear to have been first made for sale by Leupold, who published a work concerning them in 1720. His engines consisted principally of a strong copper box, closely shut and well soldered; it was very light and small, and capable of being worked by a small moving-power.

At what time these Dutch and German engines were employed in England does not clearly appear; but it may be presumed that each improvement, when its excellence had been tested by experience, was made known in England, and that the skill of our artisans gradually extended these improvements. About a century ago, Mr. Newsham was the principal London maker; and from that time to the present a constant train of improvements has been in progress, a detail of which would almost fill a volume. These improvements have had relation to the facility of working an engine,—to the quantity of water capable of being propelled by it,—to the readiest mode of supplying the engine with water,—and, in short, to every branch of the subject. Mr. Tilley has constructed fire-engines made wholly or almost wholly of metal; Mr. Braithwaite has succeeded in applying steam-power to the working of an engine; some engines have been so constructed as to be kept constantly afloat; while others again have been made in a compact form, to be kept for the protection of private mansions or large public buildings.

The subject of insurance from fire we need not here enter upon, further than to say, that it is a kind of compact among a great number of persons mutually to share each other's losses by fire, and that the medium through which this compact is made is the Insurance Company; but we may make a few observations on the Fire-engine Establishments. Until within the last seven or eight years, each Insurance Company had its own engines and firemen, and it too often happened that the latter would decline to exert themselves at the suppression of a fire, unless the building, which was a prey to it, was insured in the office to which they belonged. This circumstance, coupled with some others, led to the formation of the London Fire Establishment, in which the firemen, forming a corps called the Fire Brigade, act upon a well-arranged and united system, which renders their exertions more effectual than if they acted from divided interests. This corps is under the direction of Mr. Braidwood, who has displayed considerable energy and skill at many of the destructive fires which have occurred in the metropolis during the last few years.

Captain Manby, who so favourably distinguished himself by his ingenious invention for saving the lives of shipwrecked persons, published a small pamphlet a few years ago, in which, among other suggestions for the prevention and extinction of fires, he proposes that the water employed for that purpose should contain a certain portion of potash. He says:—"When a small quantity of simple water is cast on materials in a state of violent combustion, the heat from the burnt surface soon causes it to evaporate into steam, and the materials thus extinguished again becoming dry from the radiation of the surrounding heat, readily ignite;" but that if pearlash or potash be added to the water, "when the water evaporates, a solid incrustation of the pearlash is left on the surface, which, by defending it from the influence of the air, prevents it

from burning and from communicating flame to the contiguous parts."

The same gentleman further proposed the use of portable cylindrical vessels filled with water containing potash. His object was, to prevent the rapid spread of a fire before the arrival of the engines, by having at hand vessels capable of being managed by one person, and provided with the means, by compressed air or otherwise, of forcing a narrow stream of water with considerable power against the burning substances.

Not a year passes without the promulgation of some new plan having for its object the diminution of calamities resulting from fire. But it is evident that the plans most worthy of further attention are those which relate to the construction of houses in such a manner as to be nearly fire-proof. If a fire could be prevented from spreading from room to room, the loss of property would be very inconsiderable, and the distressing sacrifice of human life less frequent.

SCHOOL-TEACHING IN THE UNITED STATES.

[From a Correspondent.]

It occasionally happens, in countries where the general habits, customs, usages, &c. assimilate pretty closely, that, in consequence of some change in the taste or feelings of the people, or from some peculiarity in the state or formation of society, we find that new and original modes of doing or performing what has been done and performed for centuries past, are hit upon, adopted, and finally become permanently established. Not that they invariably turn out real improvements upon the antient and original customs, but there is commonly something which recommends them to the taste, views, or convenience of those by whom they are adopted. Now in the United States of America, as well as in most of our adjacent colonies, one of those new fashions and features above alluded to, and which may now be considered as an established custom, is that of the business—if so I may designate it—of common school-teaching. I have made use of the term *common* because, in almost every section of the country where the inhabitants have become comparatively populous and the settlements permanent and established, for the most part there now are schools, seminaries, academies, or collegiate institutions, established and supported either by companies or private individuals—as mere matters of speculation—or else endowed with annual grants of money from the legislature under which they exist. In other and older-fashioned countries generally, school-masters are usually stationary characters, and not in the habit of making yearly excursions in search of employment, like some of our own mechanics when they are upon what they term the "tramp." It may be true that in the vicinity of our wealthy towns and cities there are teachers and professors of the various parts into which a liberal education is divided, who are in the habit of paying daily or periodical visits to the schools or seminaries situated in the district they reside in, and are designated, according to what they profess to teach, as writing-masters, music-masters, or teachers, &c., but such, properly speaking, cannot be considered regular and *bonâ fide* schoolmasters.

New settlements, in countries where the older settled parts have become so populous as to part with a portion of their increasing population, are mostly commenced, if not principally formed, by emigrants from the older settlements, but these first settlers rarely form either the most industrious or respectable portion of the community. Such being the case, it commonly follows that those who thus voluntarily undertake to act as pioneers are by no means a class of persons likely to furnish a supply of school-teachers ;* and if some of them were ever so competent, while the settlements are quite new and the settlers mostly poor, there is not much to be done in the way of school-teaching. In colonies where most part of the first settlers are directly from foreign countries, it generally happens that a portion, at least, of those settlers are persons possessed of considerable property, and therefore the better able to provide competent persons (should there any such happen to be had) to act as schoolmasters or teachers. It is therefore principally in the interior parts of the country, among settlements that are just rising into notice and importance, that we find this class of individuals, namely, itinerant school-teachers, in such general demand. However, among new settlements generally, the children, for the most part, that are not mere babes, can be usefully employed during the summer months, and hence there is no occasion for the assistance of a school-teacher at that season of the year. But when winter sets in, and the ground becomes buried in deep snow, there is then often a scarcity of employment, not only for the younger branches of the family, but even for the older, the more hardy and robust ; for, besides the necessary attendance upon farm-stock, and perhaps a little chopping of wood, the generality of the farmers find little or no employment. It has been stated, but I know not upon what authority, that one-half of all the young men who annually emigrate from the New England states, when they arrive in the distant new settlements, for a winter or two at the least become school-teachers. I am myself well aware that to a considerable extent something of the sort is the case, for a long acquaintance with new settlements has afforded me an opportunity of much personal observation.

In the Eastern or New England States, scholastic establishments are very numerous, and a common education is obtained cheaply ; hence few of the inhabitants—who are familiarly styled Yankees—are found destitute of learning, even among those who entertain neither wish nor prospect of ever turning it to any particular account. Many, however, no doubt have a future object in view, but the great mass of the rural population send their children to school to be instructed in reading, writing, and a little arithmetic, simply with a view of their being able to transact their own business in the ordinary routine of a farmer's life. But it frequently happens that there are young men who, when they grow up, entertain no strong partialities for hard work, and who "so scheme it," to make use of an expression of their own, to procure a livelihood in as easy a manner as possible. Among these are many of the individuals that belong to the class of itinerant school-teachers, and who, although they may find it convenient as well as necessary to make use of their axes during the summer months, when the more unpleasant season for out-door employment comes on, turn their attention to school-teaching. It is therefore the prevailing custom, in nearly all the new settlements, to build a school-house as soon as circumstances appear to render such a proceeding desirable ; and the plan they adopt is simple and inexpensive, for if all those who are interested in the undertaking assemble by appointment, in a very few hours a small building of unhewn logs may be erected, provided the logs have already been prepared for the purpose of being rolled together into the form of a rude building. The fitting up of the interior is attended with but little labour or expense ; for two or three slabs, with pieces of round saplings for a couple of feet at either end, answer the purpose of forms or benches ; while two other slabs or planks, placed a little sloping along each side of the room, serve as desks or tables for the children to place their copy-books and slates upon.

It rarely happens that the parties in want of a school teacher go to the expense of advertising, even where printers are to be met with and they have an opportunity of doing

* It may be observed that the word master is very rarely made use of among the American people—at least in the non-slave-holding states ; and hence they discard it in such old-fashioned compounds as school-master, dancing-master, &c.

so; since, before the period arrives for opening school, some of those who feel the most interested in the matter probably have been looking out a little for a likely person for a teacher, not only in the settlement to which they belong, but also in some of the adjoining ones. It has already been stated that young men from the New England states are mostly employed in this way, but it occasionally happens that female teachers are chosen to this office in preference to the other sex, but the term school-teacher is indiscriminately applied to both. One principal reason for engaging females is, that they may sometimes be hired at a lower rate, and as cheapness is often a matter more attended to than character or qualification, should there be more candidates than one, the cheapest usually has the preference. Even those who receive the highest rate of wages for teaching the common schools seldom receive any more, often not quite so much as they would expect if they were employed in ordinary farm labour. In one respect persons employed to cut down timber, or attend to ordinary farming business, are better off than those teachers, for it is the prevailing custom for a teacher to board and lodge during a proportionate period of his engagement, at every house from which one child or more than one is sent to him to be instructed. Thus, if forty scholars attend the school, and the teacher is engaged for twenty weeks, with every family sending a couple of children he will have to board and lodge a twentieth part of the term of his engagement; so that should the scholars be distributed among twenty or thirty families—a very probable case—the teacher will accordingly have to become an inmate for a brief period with the same number of families. This can scarcely be an agreeable regulation, one would imagine, even for a Yankee itinerant school-teacher; and what would appear greatly to add towards making the matter still more irksome and unpleasant, according to our old-fashioned English notions of such matters, many of the settlers' houses are but sorry habitations, and often at a considerable distance from the school-house. But I have been assured by both male and female teachers, that in thus being compelled to board from house to house consists one of the chief charms of their engagements; for the poorest families generally manage to provide "wholesome victuals and drink," as they express it, for so limited a period; and should the lodging not be altogether of the most comfortable order, a few nights soon slip over. It gives, say they, an opportunity of becoming acquainted with the inhabitants of the whole settlement, and puts them in possession of many a little secret and piece of scandal, with a variety of other little interesting matters peculiarly delightful to Yankee curiosity.

Nothing is more common than for a youth of eighteen or twenty years of age to leave his native place, somewhere in the Eastern states, early in the spring or summer, and proceed westward on a trip of speculation, getting jobs of work wherever he can, as he advances on his journey, until, by the approach of winter, he probably finds himself four or five hundred miles or more from the place he set out from, and in the possession of a few dollars more than he started with. If he has been brought up in any of the older settlements, he will probably engage to perform any sort of ordinary farm-labour; but if he belong to one of the newer settlements (and several such are still to be met with in some of the Eastern states), and is better acquainted with the use of the axe than any other implement, then he will endeavour to get employed in a little chopping. When he finds the year fast drawing towards a close, he begins to examine more particularly the condition of the settlements he may happen to pass through, in order to ascertain where there is a probability of his falling in with a spell of teaching; and should he make what he considers a favourable discovery, he endeavours to get a job of work in the vicinity, in order that he may become known to the inhabitants, before the school-meetings take place on the subject of hiring a teacher. Females, however, have not an opportunity of acting in a similar way; and where one of them is engaged in preference to a young man, it commonly happens that she is the friend or relative of one of the influential settlers, and may probably have been accustomed to a little teaching in one of the older states. But the chief consideration in her favour is her willingness to perform the duties of teacher at a lower rate than a male teacher could be hired for; but this, however, is not always the case. The ordinary rate of wages is from seven to nine dollars per month, with board and lodging; sometimes even a little less, but scarcely ever any more; and were we to consider the qualifications of the parties thus employed, the rate would not appear so very low.

There is another view which is frequently taken of this system of itinerant school-teaching, and with regard to which many consider it as one of the chief inducements with the young men to seek employment in this way, and numerous instances of events are constantly occurring that tend to establish a good foundation upon which to base such an opinion. What we here allude to is this,—the opportunity it affords of forming matrimonial engagements with such of the girls as may be considered the flower of the settlements. Indeed I have frequently heard it admitted that the school-teachers and the wandering Yankee pedlars were a greater terror to such mothers as did not wish to part with their daughters than all the young men belonging to their own neighbourhood. But the pedlars, too, sometimes take up the trade of school-teaching, when—what with their captivating small ware, their miraculous tales of love and wonder, and their general stock of flattery and falsehood—it cannot be considered very surprising that they should so often be found captivating the hearts of the settlers' daughters, particularly such as possess handsome persons and prosperous connections to recommend them to the notice of these speculating adventurers.

Growth of the Vine in England.—It is not too much to assert that the surface of the walls of every cottage of a medium size that is applicable to the training of vines is capable of producing annually as many grapes as would be worth half the amount of its rental. Every square foot of the surface of a wall may, in a short space of time, be covered with bearing wood, sufficient to produce, on an average, a pound weight of grapes, and I have frequently grown double that quantity on a similar extent of surface. Nor must it be supposed that a single vine requires for its training a large portion of walling. That very common notion has, no doubt, arisen from the universally defective method of pruning and managing; whereby the wood is suffered, and indeed encouraged, to extend itself most disproportionately beyond the capability of its fruit-bearing powers. I scarcely ever allot more than from forty to fifty square feet of surface for one vine; and, unless the soil and situation be very superior indeed, a single vine will require a space of time, not less than twenty years at least, before it will possess a sufficient degree of strength to enable it to mature annually a greater quantity of grapes than can be trained on the last-mentioned extent of surface. On a wall only twenty-five inches in height, and eighteen feet in length, I have for years trained a vine that is a perfect picture of fertility, the whole surface of the wall being every year literally covered with fine grapes close down to the very stem of the plant. It will thus be seen that small detached portions and vacant spaces of the surface of walls, which in innumerable instances are deemed of no value, and are therefore neglected, may be turned to a most beneficial account.—*Cultivation of the Grape on Open Walls, by C. Hoare.*

*** The Office of the Society for the Diffusion of Useful Knowledge is at 59, Lincoln's Inn Fields.

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